

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

TestAmerica Job ID: 160-6492-1

Client Project/Site: Beta Chem site, Lenexa, KS

For:

Tetra Tech EM Inc.  
415 Oak Street  
Kansas City, Missouri 64106

Attn: Danny O'Connor



Authorized for release by:  
5/9/2014 11:41:06 AM

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*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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## Case Narrative

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

**Job ID: 160-6492-1**

**Laboratory: TestAmerica St. Louis**

### Narrative

## CASE NARRATIVE

**Client: Tetra Tech EM Inc.**

**Project: Beta Chem site, Lenexa, KS**

**Report Number: 160-6492-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

### RECEIPT

The samples were received on 5/6/2014 7:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.5° C.

### TRITIUM, TOTAL (LSC)

Samples G2 PVC INTAKE (160-6492-1), G1 HOOD FRAME (160-6492-2), G1 HYDROGEN CYLINDER (160-6492-3), G1 ARGON CYLINDER (160-6492-4), CONTAINER 20 (160-6492-5), CONTAINER 7R (160-6492-6), CONTAINER 19 (160-6492-7) and CONTAINER 16 (160-6492-8) were analyzed for Tritium, Total (LSC) in accordance with C\_01\_1. The samples were prepared on 05/06/2014 and analyzed on 05/08/2014.

The following samples are filters: CONTAINER 16 (160-6492-8), CONTAINER 19 (160-6492-7), CONTAINER 20 (160-6492-5), CONTAINER 7R (160-6492-6), G1 ARGON CYLINDER (160-6492-4), G1 HOOD FRAME (160-6492-2), G1 HYDROGEN CYLINDER (160-6492-3), G2 PVC INTAKE (160-6492-1). The filters were placed in a scintillation vial and 10 mL of carbo-sorb e+ and 10 mL of permafluor e+ was added. The batch was then submitted for direct count.

## Case Narrative

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

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### Job ID: 160-6492-1 (Continued)

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#### Laboratory: TestAmerica St. Louis (Continued)

The detection goal was not met for the following sample due to a shortened count time which can be attributed to high activity: G2 PVC INTAKE (160-6492-1). Analytical results are reported with the detection limit achieved.

No other difficulties were encountered during the Tritium, Total (LSC) analysis.

All other quality control parameters were within the acceptance limits.



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Date: 5/5/14  
Page: 1 of 1  
Project No: X9025140060  
Shipment Method: FEDEX  
Number of Coolers Shipped: 1



160-6492 Chain of Custody

Relinquished By:  (Signature)	Received By:  (Signature)	Date: 5-6-14	Time: 0700
Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:
Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:

## Login Sample Receipt Checklist

Client: Tetra Tech EM Inc.

Job Number: 160-6492-1

Login Number: 6492

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Definitions/Glossary

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

### Qualifiers

#### Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

## Method Summary

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

Method	Method Description	Protocol	Laboratory
C-01-1	Carbon-14 (EERF C-01-1)	EERF	TAL SL

**Protocol References:**

EERF = EERF

**Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



## Sample Summary

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-6492-1	G2 PVC INTAKE	Filter	05/05/14 12:30	05/06/14 07:00
160-6492-2	G1 HOOD FRAME	Filter	05/05/14 12:35	05/06/14 07:00
160-6492-3	G1 HYDROGEN CYLINDER	Filter	05/05/14 12:40	05/06/14 07:00
160-6492-4	G1 ARGON CYLINDER	Filter	05/05/14 12:45	05/06/14 07:00
160-6492-5	CONTAINER 20	Filter	05/05/14 12:50	05/06/14 07:00
160-6492-6	CONTAINER 7R	Filter	05/05/14 12:55	05/06/14 07:00
160-6492-7	CONTAINER 19	Filter	05/05/14 13:00	05/06/14 07:00
160-6492-8	CONTAINER 16	Filter	05/05/14 13:05	05/06/14 07:00

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

## Client Sample ID: G2 PVC INTAKE

Date Collected: 05/05/14 12:30

Date Received: 05/06/14 07:00

Lab Sample ID: 160-6492-1

Matrix: Filter

### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	10100	G	151	1100	5.00	5.54	pCi/Sample	05/06/14 14:11	05/08/14 12:24	1

## Client Sample ID: G1 HOOD FRAME

Date Collected: 05/05/14 12:35

Date Received: 05/06/14 07:00

Lab Sample ID: 160-6492-2

Matrix: Filter

### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	3420		51.3	373	5.00	2.88	pCi/Sample	05/06/14 14:11	05/08/14 12:27	1

## Client Sample ID: G1 HYDROGEN CYLINDER

Date Collected: 05/05/14 12:40

Date Received: 05/06/14 07:00

Lab Sample ID: 160-6492-3

Matrix: Filter

### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	858		12.9	93.5	5.00	1.39	pCi/Sample	05/06/14 14:11	05/08/14 12:33	1

## Client Sample ID: G1 ARGON CYLINDER

Date Collected: 05/05/14 12:45

Date Received: 05/06/14 07:00

Lab Sample ID: 160-6492-4

Matrix: Filter

### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	299		4.53	32.6	5.00	0.885	pCi/Sample	05/06/14 14:11	05/08/14 12:49	1

## Client Sample ID: CONTAINER 20

Date Collected: 05/05/14 12:50

Date Received: 05/06/14 07:00

Lab Sample ID: 160-6492-5

Matrix: Filter

### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	260		3.95	28.3	5.00	0.859	pCi/Sample	05/06/14 14:11	05/08/14 13:29	1

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## Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

### Client Sample ID: CONTAINER 7R

Date Collected: 05/05/14 12:55

Date Received: 05/06/14 07:00

### Lab Sample ID: 160-6492-6

Matrix: Filter

#### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2 $\sigma$ +/-)	Total Uncert. (2 $\sigma$ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	208		3.17	22.7	5.00	0.786	pCi/Sample	05/06/14 14:11	05/08/14 14:17	1

### Client Sample ID: CONTAINER 19

Date Collected: 05/05/14 13:00

Date Received: 05/06/14 07:00

### Lab Sample ID: 160-6492-7

Matrix: Filter

#### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2 $\sigma$ +/-)	Total Uncert. (2 $\sigma$ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	37.8		1.30	4.28	5.00	0.744	pCi/Sample	05/06/14 14:11	05/08/14 15:15	1

### Client Sample ID: CONTAINER 16

Date Collected: 05/05/14 13:05

Date Received: 05/06/14 07:00

### Lab Sample ID: 160-6492-8

Matrix: Filter

#### Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2 $\sigma$ +/-)	Total Uncert. (2 $\sigma$ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	20.4		0.998	2.42	5.00	0.744	pCi/Sample	05/06/14 14:35	05/08/14 16:23	1

# QC Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

## Method: C-01-1 - Carbon-14 (EERF C-01-1)

Lab Sample ID: MB 160-120490/1-A

Matrix: Filter

Analysis Batch: 121146

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 120490

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.8243		0.475	0.483	5.00	0.750	pCi/Sample	05/06/14 14:11	05/08/14 10:08	1

Lab Sample ID: LCS 160-120490/2-A

Matrix: Filter

Analysis Batch: 121146

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 120490

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Carbon-14	21.1	21.81		2.56	5.00	0.727	pCi/Samp	103	67 - 124

## QC Association Summary

Client: Tetra Tech EM Inc.  
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6492-1

### Rad

#### Prep Batch: 120490

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-6492-1	G2 PVC INTAKE	Total/NA	Filter	LSC_Dist_Susp	
160-6492-2	G1 HOOD FRAME	Total/NA	Filter	LSC_Dist_Susp	
160-6492-3	G1 HYDROGEN CYLINDER	Total/NA	Filter	LSC_Dist_Susp	
160-6492-4	G1 ARGON CYLINDER	Total/NA	Filter	LSC_Dist_Susp	
160-6492-5	CONTAINER 20	Total/NA	Filter	LSC_Dist_Susp	
160-6492-6	CONTAINER 7R	Total/NA	Filter	LSC_Dist_Susp	
160-6492-7	CONTAINER 19	Total/NA	Filter	LSC_Dist_Susp	
160-6492-8	CONTAINER 16	Total/NA	Filter	LSC_Dist_Susp	
LCS 160-120490/2-A	Lab Control Sample	Total/NA	Filter	LSC_Dist_Susp	
MB 160-120490/1-A	Method Blank	Total/NA	Filter	LSC_Dist_Susp	